AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1.   (currently amended) A method for guiding an end effector to a target position within a person, the end effector being spatially associated with a robot coordinate system, the method comprising:

generating a plurality of digital images of an interior anatomy of the person when the person has a predetermined respiratory state, the digital images being spatially associated with a digital image coordinate system;

indicating a skin entry position on at least one of the digital images;

indicating the target position on at least one of the digital images;

determining a trajectory path based on the skin entry position and the target position;

registering the spatial relationship between the end effector and the robot coordinate system with the spatial relationship between the end effector and the digital image coordinate system via a fiducial component associated with the end effector and visible in the digital images, thereby linking the end effector to the digital image coordinate system; and

in response to the registering, movement of the fiducial component in the digital image coordinate system, and points specified in the digital image coordinate system, moving the end effector along the trajectory path toward the target position when the

person has substantially the predetermined respiratory state and stopping movement of the end effector when the person does not substantially have the predetermined respiratory state;

wherein the determining a trajectory path comprises determining a trajectory path in the robot coordinate system by transforming a specified trajectory path in the digital image coordinate system via coordinate transformation.

2.   (original) The method of claim 1, wherein generating the plurality of digital images comprises:

moving the person within a scanning device along an axis; and,

generating the plurality of cross-sectional digital images during the movement wherein each cross-sectional image is generated at a distinct axial position.

3.   (original) The method of claim 1, wherein moving the end effector comprises:

monitoring a respiratory state of the person over time; and

moving the end effector along the trajectory path when a difference between the monitored respiratory state and the predetermined respiratory state is less than or equal to a threshold value.

4.   (original) The method of claim 1, wherein the end effector is moved at a predetermined speed.

5.   (original) The method of claim 1, wherein the plurality of digital images comprises a plurality of computerized tomography images.

6.   (currently amended) A system for guiding an end effector to a target
position within a person, the end effector being spatially associated with a robot
coordinate system, the system comprising:

a respiratory monitoring device for monitoring a respiratory state of the person;

a scanning device configured to scan an interior anatomy of the person when the
person has a predetermined respiratory state to generate scanning data;

a first computer generating a plurality of digital images based on the scanning
data, the plurality of digital images being spatially associated with a digital image
coordinate system;

a second computer configured to display the plurality of digital images, the second
computer further configured to allow an operator to indicate a skin entry position on at
least one of the digital images, the second computer further configured to allow the
operator to indicate the target position on at least one of the digital images, the second
computer further configured to determine a trajectory path based on the skin entry
position and the target position, the second computer further configured to register the
spatial relationship between the end effector and the robot coordinate system with the
spatial relationship between the end effector and the digital image coordinate system via a
fiducial component associated with the end effector and visible in the digital images,
thereby linking the end effector to the digital image coordinate system, the second
computer further configured to determine the trajectory path by determining a trajectory
path in the robot coordinate system by transforming a specified trajectory path in the
digital image coordinate system via coordinate transformation; and

an end effector insertion device having the end effector adapted to be inserted into
the person, the second computer inducing the end effector insertion device to move the
end effector along the trajectory path toward the target position when the person has

substantially the predetermined respiratory state <u>and to stop movement when the person does not substantially have the predetermined respiratory state</u>.

7.   (original) The system of claim 6, wherein the respiratory monitoring device comprises an infrared respiratory measurement device that detects a position of a chest of the person.

8.   (original) The system of claim 6, wherein the scanning device comprises a computerized tomography scanner and the plurality of digital images comprise a plurality of computerized tomography images.

9.   (original) The system of claim 6, wherein the end effector insertion device comprises an end effector driver configured to linearly move the end effector.

10.   (original) The system of claim 6, further comprising a positioning device operably coupled to the end effector insertion device for disposing the end effector insertion device at a predetermined position.

11.   (original) The system of claim 6, wherein the end effector insertion device can orient the end effector along the trajectory path.

12.   (original) The system of claim 6, wherein the second computer is further configured to move the person within the scanning device for generating the plurality of digital images during the movement wherein each digital image is generated at a distinct axial position of the person.

13.   (original) The system of claim 6, wherein the person has substantially the predetermined respiratory state when a difference between the monitored respiratory state and the predetermined respiratory state is less than or equal to a threshold value.

14.   (original) The system of claim 6, wherein the second computer induces the end effector insertion device to move the end effector along the trajectory path toward the target position at a predetermined speed.

15.   (currently amended) A system for guiding an end effector to a target
position within a person, the end effector being spatially associated with a robot
coordinate system, the system, comprising:

a respiratory monitoring device for monitoring a respiratory state of the person;

a scanning device configured to scan an interior anatomy of the person when the
person has a predetermined respiratory state to generate scanning data;

a first computer generating a plurality of digital images based on the scanning
data, the plurality of digital images being spatially associated with a digital image
coordinate system, the first computer further configured to display the plurality of digital
images, the first computer further configured to allow an operator to indicate a skin entry
position on at least one of the digital images, the first computer further configured to
allow the operator to indicate the target position on at least one of the digital images, the
first computer further configured to determine a trajectory path based on the skin entry
position and the target position, the first computer further configured to register the
spatial relationship between the end effector and the robot coordinate system with the
spatial relationship between the end effector and the digital image coordinate system via
a fiducial component associated with the end effector and visible in the digital images,
thereby linking the end effector to the digital image coordinate system, the first computer
further configured to determine the trajectory path by determining a trajectory path in the
robot coordinate system by transforming a specified trajectory path in the digital image
coordinate system via coordinate transformation; and

an end effector insertion device having the end effector adapted to be inserted into
the person, the first computer inducing the end effector insertion device to move the end
effector along the trajectory path toward the target position when the person has
substantially the predetermined respiratory state and to stop movement when the person
does not substantially have the predetermined respiratory state.

16.   (currently amended) An article of manufacture, comprising:

a computer storage medium having a computer program encoded therein for guiding an end effector to a target position within a person, the end effector being spatially associated with a robot coordinate system, the computer storage medium including:

code for displaying and generating a plurality of digital images of an interior anatomy of the person when the person has a predetermined respiratory state, the plurality of digital images being spatially associated with a digital image coordinate system;

code for indicating a skin entry position on at least one of the digital images;

code for indicating the target position on at least one of the digital images;

code for determining a specified trajectory path based on the skin entry position and the target position;

code for determining a trajectory path in the robot coordinate system by transforming the specified trajectory path in the digital image coordinate system via coordinate transformation;

code for registering the spatial relationship between the end effector and the robot coordinate system with the spatial relationship between the end effector and the digital image coordinate system via a fiducial component associated with the end effector and visible in the digital images, thereby linking the end effector to the digital image coordinate system; [[and]]

code for moving the end effector along the trajectory path in the robot coordinate system toward the target position when the person has substantially the predetermined respiratory state; and

<u>code for stopping movement of the end effector when the person does not substantially have the predetermined respiratory state</u>.

17.   (original) The article of manufacture of claim 16, wherein the code for displaying the plurality of digital images comprises:

code for scanning a predetermined region of the person along an axis; and,

code for generating the plurality of digital images during the movement wherein each digital image is generated at a distinct axial position.

18.   (original) The article of manufacture of claim 16, wherein the code for moving the end effector comprises:

code for monitoring a respiratory state of the person over time; and

code for moving the end effector along the trajectory path when a difference between the monitored respiratory state and the predetermined respiratory state is less than or equal to a threshold value.

19.   (original) The article of manufacture of claim 16, wherein the computer storage medium further includes code for moving the end effector at a predetermined speed into the person.

20.   (original) The article of manufacture of claim 16, wherein the plurality of digital images comprises a plurality of computerized tomography images.

21.   (currently amended) A method for guiding an end effector to a target position within a person, the end effector being spatially associated with a robot coordinate system, the person having an associated plurality of digital images that are spatially associated with a digital image coordinate system, comprising:

monitoring a respiratory state of a person during at least one respiratory cycle;

registering the spatial relationship between the end effector and the robot coordinate system with the spatial relationship between the end effector and the digital image coordinate system via a fiducial component associated with the end effector and visible in the digital images, thereby linking the end effector to the digital image coordinate system;

determining a trajectory path in the robot coordinate system by transforming a specified trajectory in the digital image coordinate system via coordinate transformation; and

in response to the registering and movement of the fiducial component in the digital image coordinate system, moving the end effector along a trajectory path in the robot coordinate system toward the target position in the person when the person has substantially a predetermined respiratory state and stopping movement of the end effector when the person does not substantially have the predetermined respiratory state.

22.   (previously presented) The method of Claim 1, further comprising:

generating a gating signal having a defined logical level in response to the person having substantially the predetermined respiratory state;

wherein the moving the end effector occurs in response to the gating signal having the defined logical level; and

wherein the moving the end effector does not occur in response to the gating signal not having the defined logical level.

23.   (previously presented) The method of Claim 1, wherein

the moving the end effector occurs in a plurality of steps, each step being in response to the person having substantially the predetermined respiratory state as determined by a gating signal having a defined logical level, until the end effector reaches the target position.